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(54) Title: DATA STORAGE UNIT

(57) Abstract: The present invention relates to a portable data transfer unit which comprises data storage means and a data transfer terminal configured to receive data from the cash register for storage in the data storage means. Data stored on the data storage unit can then be transferred via the data transfer terminal of the unit to a control terminal by either a direct data transfer connection (where the data transfer terminal of the unit is releasably connected to a data output terminal of the cash register or a data input terminal of the control terminal), optical fibre data transmission, radio frequency data transmission, or infrared data transmission. The control terminal is preferably a PC having data analysis software and/or databases operating thereon.



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### DATA STORAGE UNIT

The present invention relates to a data storage unit and more particularly to a portable data storage unit.

In a busy commercial retail outlet, such as a convenience store or supermarket, numerous transactions occur at cash registers as customers  
5 purchase items or services. Data collected regarding these transactions provides information that is essential for the operation of the business. In particular, the transaction data is used to generate the business accounts by correlating the income from the sale of goods or services occurring at the cash  
10 registers with costs incurred by the business. The transaction data generated at a cash register also provides a record of the transactions that have occurred and this can be correlated with the physical payments (cash, cheques etc.) that are collected at the cash register over a specified period of time, usually a working day or a shift. This enables the production of a financial balance for an  
15 individual cash register or a group of cash registers and any discrepancy between the physical payments collected and the transaction records can be identified and accounted for.

In addition, cash registers equipped with bar-code readers or specific key entries that correspond to a specific item or service sold can also generate  
20 valuable data regarding the identity of goods and/or services sold. This data can be used to produce sales figures for a specific item or a range of items and also enables the stock levels of goods to be monitored as specific items are sold.

A problem arises with the provision of a simple, cost effective and  
25 efficient procedure for collecting and utilising the valuable data generated at a cash register.

The present invention solves this problem by providing, in a first aspect, a portable data storage unit adapted to receive and store data generated by a cash register and to transfer said data to a control terminal, said data storage unit comprising:

- 5           (i)     data storage means; and
- (ii)    a data transfer terminal configured to receive data from said cash register for storage in said data storage means and to transfer data stored to said data storage means to said control terminal.

10           The portable data storage unit to which the present application pertains is adapted for use with a cash register. The term "cash register" is used herein to denote any electronic cash register, with or without a bar code reader; a bar-code reader alone or any similar electronic transaction-processing device that may be found in a commercial retail environment.

15           It is an important feature of the present invention that the data storage unit is portable and by "portable" we mean that the data storage unit may be conveniently transported from one location to another by an operator. Consequently, the unit is preferably of a suitable size, shape and weight so as to facilitate convenient transportation. Furthermore, the data storage unit may be  
20           provided with a handle or other suitable gripping device to assist an operator in the transportation of the unit.

          Preferably, the data transfer terminal comprises a data input terminal, which receives the transactional data generated by the cash register during use, and a data output terminal, via which the data stored on the data storage unit  
25           can be transferred to the control terminal.

          To collect electronic data from a cash register, a releasable connection is preferably formed between the data terminal transfer of the data storage unit

and a data output terminal cash register. The connection formed between the data transfer terminal of the data storage unit and the cash register may be any releasable engagement connection that enables data to be transferred, such as a releasable male/female electronic connection. For example, the portable data storage unit may be provided with a female connection terminal configured to releasably engage with a male connection terminal provided on the cash register. Alternatively, the portable data unit may be releasably connected to the cash register via a data transfer cable, preferably a flexible cable, having, for example, a male connection terminal provided at the terminus of the cable and configured to releasably engage with a female data input terminal provided on the data storage unit. Preferably, a direct connection is formed between the cash register and the data input terminal of the data storage unit (in the absence of any cable connection).

In especially preferred embodiments, the data storage unit is configured to be releasably mounted on to, or received within a cavity of, the cash register such that when the unit is mounted on to, or received within a cavity or recess of the cash register, the data transfer terminal of the data storage unit is brought into a data transfer engagement with the data output terminal of the cash register. Furthermore, this data transfer connection will be broken when the portable data storage unit is dismounted from the cash register.

Data may also be transferred between the cash register and the portable data storage unit by any suitable alternative means, such as an optical fibre cable connection, a radio frequency transmission link, infrared transmission or an ultrasound signal. In the case of radio frequency data transmission, the cash register is provided with a radio frequency transmitter for transmitting data to a radio frequency receiver provided at the data input terminal of the unit. In the case where the data is transmitted by infrared or ultrasound, the cash register is

provided with either an infrared data transmitter or an ultrasound signal transmitter respectively, and the data input terminal of the unit is provided with either an infrared data receiver or an ultrasound signal receiver respectively.

5 The portable data storage unit is also preferably provided with a separate data output terminal through which data stored in the memory of the data storage unit is transferred to a control terminal. The data output terminal may be either portion of a releasable electronic engagement connector such as one of either the male or female elements of a male/female data transfer connector.

10 Data may also be transferred from the portable data storage unit to the control terminal by any suitable alternative means such as an optical fibre cable connection, a radio frequency transmission link, infrared data transmission or an ultrasound signal. In the case of radio frequency transmission, the data output terminal of the portable data storage unit is provided with a radio  
15 frequency transmitter as a data output terminal and the control terminal is provided with a radio frequency receiver to receive the transmitted data. In the case of data transmission by infrared or ultrasound, the data output terminal of the data storage unit is either an infrared or ultrasonic transmitter respectively and the control terminal is equipped with either an infrared or ultrasound  
20 receiver respectively.

In embodiments where data transfer between the cash register and the unit, and the unit and the control terminal is by a releasable engagement connection, a data transfer cable or an optical fibre connection, the data transfer terminal may have a dual function so as to enable operation as both the data  
25 input and data output terminals (i.e. only one data terminal is provided instead of separate data input and data output terminals).

Data transfer between either the cash register and the data storage unit, or the data storage unit and the control terminal can be bi-directional, i.e. data

can be transmitted either way. Accordingly, the cash register, data storage unit and the control terminal may be provided with appropriate transmitters and receivers, depending on the means of data transmission utilised. This enables the data sender, i.e. the cash register in the case of data transfer between the  
5 cash register and the unit and the data storage unit, in the case of data transfer between the unit and the control terminal, to initially send a signal to the receiver (i.e. the unit or the control terminal) to ask if it is ready to receive data. A signal indicating that the receiver is “ready” can then be returned to the data sender. Data transfer can then be activated in the usual manner.

10 In the case of data transfer between the data storage unit and the control terminal, this can be done by pressing a “ready” button on the data storage unit and data would then transfer automatically to the control terminal on receipt of a “ready” signal by the data storage unit from the control terminal, as a response. Similarly, in the case of data transfer from the cash register to  
15 data storage unit, pressing a “ready” button provided on the cash register could lead to a “ready” response signal from the data storage unit to the cash register and, in this case, also to the display of “ready” on an LCD screen provided on the data storage unit. Transactions could then commence in the confidence that the system is working properly.

20 Transactions occurring at the cash register result in the generation of data that is stored in the form of data items, each data item comprising information regarding the transaction that has occurred. The data items collected may contain a variety of types of different information regarding the transaction that has occurred such as, for example, the date and time at which  
25 the transaction took place, the identity of the item or service sold, the pack size or quantity of goods or services sold, the value of the transaction, or the amount of tax added or discount deducted etc. Each data item also preferably comprises an identity code that specifically identifies the cash register that has

generated the data item. Additionally, each operator of the cash register can have an identity code which is input into the cash register during a "log on" procedure and which then forms a constituent of the data item to also enable the identification of the operator of the cash register conducting the transaction to which the data item relates. Although till receipts may be printed for issuing to a customer in the normal manner, the provision of an electronic data storage system to collect transaction information in the form of data items as referred to above, obviates the requirement to generate a copy of the till receipts for the manual collection and collation of data or for tax inspection purposes. In certain embodiments of the present invention, however, it is still possible to obtain a printed record of the transactions that have occurred for verification of the electronic data collected or for tax inspection purposes if considered necessary.

The data storage unit is preferably provided with a display screen, such as an LCD display, that displays data received from the cash register. Preferably, the data is displayed on this screen simultaneously with the cash register display.

The data generated by the cash register and received by the data input terminal of the data storage device are stored as individual data items in the data storage means (or memory) of the portable data unit. In effect, the data storage means functions as a temporary memory buffer that stores data items until such a time occurs when the data items are transferred to the control terminal. Preferably, the data items are time and date referenced and stored in the data storage means in chronological order to form a data set. In a preferred embodiment, the data storage means is provided with a sufficient data storage capacity so as to enable the storage of data items generated by a cash register in continuous use for at least a full working day, and more preferably, a week. Additional data storage means capacity may be fitted to the portable data

storage unit to boost the data storage capacity if required. In an alternative preferred embodiment, the data storage unit may be provided with a secondary “back-up” data storage means that stores a duplicate copy of the data stored on the principle data storage means. The secondary data storage facilitates the transfer of data in situations where the data stored in the principal data storage means has been corrupted or partially or wholly lost.

In addition, to enable the efficient operation of the data storage unit, the data storage means is preferably provided with a warning means, either in the form of a warning light or other visual display, or an audible sound that is emitted when the warning means is activated. The warning means functions to alert an operator when the storage capacity of the data storage means is nearly saturated and, therefore, complete memory saturation is imminent. Preferably, a series of warnings are provided to attract the attention of the operator. In addition, following the activation of the warning means, the data storage unit will preferably continue to function and accept further data items until the memory capacity of the data storage means is reached. When the data storage capacity is reached, the continued use of the data storage means is preferably inhibited along with the processing of further transactions at the cash register until the data storage unit is removed and free capacity in the data storage means is generated by transferring the stored data to the control terminal. Alternatively, the data storage unit may be replaced by a second data storage unit having available memory capacity so as to enable the continued operation of, and receipt of data from, the cash register.

In a preferred mode of operation, the data storage unit is periodically disconnected from the cash register (or the receipt of data by radio frequency, infrared or ultrasound signal transmission inhibited) at a pre-selected time interval, such as the end of the working day or shift, or when a warning has been issued indicating that the saturation of the capacity of the data storage



means has been reached or nearly reached. Following disconnection of the data storage unit from the cash register, the unit is transported to the control terminal where a data transfer connection is formed between the output terminal of the data storage unit and the control terminal as previously discussed. The data set  
5 stored on the portable data storage unit is copied to the control terminal for analysis and long-term storage. Preferably, the data is copied in chronological order to the control terminal until the data set has been copied in its entirety. In preferred embodiments, the invention is provided with a display screen and the copying of data from the data storage unit to the control terminal can be  
10 monitored by viewing a graphical representation provided on the display screen which illustrates the data copying procedure. This can also be witnessed on the visual display unit (VDU) of the control terminal.

Once copied and stored at the control centre the data items can be cleared from the data storage means. Successful copying of all data stored is  
15 first viewed on the VDU of the control terminal by use of "page down" and "page up" buttons or by scrolling (for example using a mouse) between the first and last data items. A first and last reference can be provided by the data set to aid this purpose.

A preferred method of clearing the data storage means is by a clear  
20 memory procedure which requires an operator to select an option from the LCD screen. This procedure preferably incorporates a checking routine to ensure that clearance of copied data is intentional and that the data has been successfully stored at the control terminal. A clear key may be provided for this purpose. The clear key may be received within a socket on the data storage unit  
25 or may be otherwise mechanical protected to avoid accidental operation.

The control terminal is preferably one or more conventional personal computers (PC's) supporting software packages and/or databases with which the transferred data is to be processed. If two or more control terminals are

involved, it is necessary for the data from each control terminal to be transferred to and accumulated at a single control terminal or on a single control server so as to enable the cumulative collation and analysis of all the data collected at each individual control terminal.

5           In a preferred embodiment of the invention, the control terminal supports software designed to read the time and date references of data items transferred or copied from the data storage means to the control terminal to verify that the data transferred is in chronological order. In addition, further software programs and databases may be provided to process and analyse the  
10 data collected. For example, the information contained within a data item regarding the identity, pack size and number of units of a specific stock item or service that has been sold can be used to generate sales figures for specific items or services sold and/or to monitor the stock levels of goods. In particular, sales information can be used to update databases that monitor stock levels of  
15 the items available for sale, and when a predetermined minimum stock level of a specific product is reached, replacement stock can be automatically re-ordered or the option of reordering presented to the operator. This data can also be used to identify losses of stock occurring due to theft or damage by correlating the actual stock levels of specific goods in the retail outlet with electronically  
20 generated stock levels based solely on orders for goods received and items sold.

The data may also be used for the generation of financial data such as profits, daily/weekly/monthly/quarterly or yearly returns, net sales, cash flow etc., by correlating the income generated from the transaction data collected at the cash registers with the expenditure and costs incurred by the business. The  
25 data can also be used to identify losses occurring by at individual cash registers when discrepancies arise between the physical payments received (cash, cheques, credit card debit receipts etc.) and the electronic transactional data generated at each cash register. Likewise, losses incurred by individual

operators can also be monitored by correlating the payments collected at the cash register by the operator with the transaction data generated by the cash register.

Preferably, the software of the control terminal is also adapted to sort  
5 the collected data items by the identity codes that indicate a specific cash register or operator. This enables the transactional data from a specific cash register or operator to be individually selected and analysed in addition to the analysis of data amalgamated from all the individual cash registers or operators.

The data storage unit of the present invention may derive power from  
10 the cash register or the control terminal when the connection between the two is formed. However, in a preferred embodiment, the data storage unit is provided with a battery power supply. Preferably, the battery power supply is rechargeable and may be provided with a separate recharging unit on to which the data storage unit or units may be mounted for recharging or, as an  
15 alternative, the battery may be recharged when the data storage unit is mounted to or connected to the cash register or control terminal.

Implementations of systems utilising the portable data storage unit of the present invention frequently require the provision of a number of data units to support a number of cash registers that are in use. Accordingly, the invention  
20 also provides, in a further aspect, a method of transferred data from one or more cash registers to a control terminal for collation and analysis, said method comprising the steps of;

- (i) collecting data generated by said one or more cash registers and storing said data in one or more portable data storage units as  
25 defined herein, and
- (ii) transferring said data from the portable data storage unit to said control terminal for collation and analysis.

Such systems may have a constant circulation of portable data storage units. For example, a first data storage unit is connected to a cash register to store data and, at a selected time interval, is disconnected from the cash register and replaced by a second data storage unit having free memory capacity to enable further utilisation of the cash register for data collection. The first data unit is then transported to the control terminal where the data is subsequently transferred or copied to the control terminal and the data storage means of the first data storage unit is cleared of all stored data so as to render the data storage unit available for further data collection. The net result is a periodical transfer of data from one or more cash registers to the control terminal where the time reference data is collated, processed and analysed.

How the invention will be put into practice will now be described, by example only, in reference to the following figures in which:

FIGURE 1 is a diagrammatic illustration of a data transfer system utilising portable data storage units;

FIGURE 2 is a diagrammatic illustration detailing a portable data storage unit shown in Figure 1;

FIGURE 3 is a diagrammatic illustration of a chronological data set stored in the memory of the data storage unit shown in Figure 2;

FIGURE 4 is a flow chart detailing the data collection and storage procedure of the data storage unit; and

FIGURE 5 is a further flow chart detailing the data transfer procedure in which stored data is transferred from the data storage unit to a control terminal.

Figure 1 shows a data transfer system utilising portable data storage units of the present invention. Three cash registers 101a, 101b and 101c, generate transactional data as items are sold. Each transaction generates a data

item which is received and stored by one of the portable storage data units 102a, 102b and 102c respectively. The data storage units 102a, 102b and 102c, are mounted on to the cash registers 101a, 101b and 101c respectively, forming a releasable data transfer connection represented by 103a, 103b and 103c  
5 respectively, through which data is electronically transferred from the cash register to the data storage unit following each transaction. At pre-selected time intervals, for example the end of each working day, the portable data storage units 102a, 102b and 102c, are disconnected from the cash registers 101a, 101b and 101c respectively, thereby breaking the electronic connection  
10 between the cash registers and the portable data storage units. The portable data storage units 102a, 102b and 102c, are then transported to a control terminal 105 which, in the present embodiment, is a conventional personal computer having software and databases operating thereon. A further releasable connection, as indicated by 104a, 104b and 104c, is formed between  
15 the portable data storage units 102a, 102b and 102c respectively, and the control terminal 105. Data stored on the portable data storage units is then transferred to the control terminal 105 for further processing, collation and analysis.

The portable data storage unit 102a is shown diagrammatically in more  
20 detail in Figure 2. The data storage unit 102a has a female data input terminal 201 that releasably engages with a corresponding male terminal provided on the cash register 101a (not shown) and receives data items generated following transactions occurring at the cash register and a "ready" signal when connected to the control terminal. The data items are transferred to the memory 203 for  
25 storage via the control circuitry 202. The control circuitry 202 is energised by the power supply 204, which is a rechargeable battery provided with a recharging port 205 and a LCD charge level indicator 206. The recharger port

205 engages with a charging unit provided on the cash register 101a to recharge the power supply 204 whilst the portable data unit 102a is in use receiving data.

A data output terminal 207 is a female socket configured to engage with a corresponding male connection socket of a cable connected to the control terminal 105 to enable the transfer of data from the memory 203 to the control terminal via the control circuitry 202 and the data output terminal 207 and the transfer of a "ready" signal to the cash register when connected thereto.

The process by which data is stored in the memory 203 is shown diagrammatically in Figure 3. Data is stored in the form of a data stack 300 that comprises a sequential chronological stack of data items, such as Data Items 1 to 4 that occupy the first four chronological data storage positions 301 to 304 respectively of the memory stack. Further sequential data items (Data Items 5 to 975) are stored chronologically in the data stack within the dotted region indicated by reference 305 with Data Items 976, 977 and 978 occupying the three upper most positions of the data stack shown as 306, 307 and 308 respectively in Figure 3. As the next chronological data item is received, in this case Data Item 979, the data item is allocated the next chronological position at the top of the data stack as indicated by reference number 320. The accumulation of data items continues until a saturation level 330 is reached. The saturation level 300 represents the maximum storage capacity of the memory 203. Prior to reaching the memory saturation level 330, a warning level 331 is provided to alert an operator when the data stack 330 is approaching the memory saturation level and that the data storage unit 102a will imminently require the stored data to be transferred to the control terminal.

The process by which data is received and stored in the data storage unit is shown in more detail in the flow chart shown in Figure 4. At step 401, the portable data unit is mounted to the cash register so as to form a releasable connection between the input terminal and the cash register for the receipt of

data items. When a transaction occurs, a data item detailing the transaction that has occurred is transmitted to the data storage unit where it is received, as indicated at step 402, and stored in the first chronological memory position at step 403. Further data items are collected at step 404 and stored in  
5 chronological order (step 405), as described in reference to Figure 3. When each data item is stored at step 405 a question is asked as to whether the number of items stored is above a predetermined warning level (step 406). If the answer to the question is "no" then the process returns to step 404 in which further data items are collected and then stored in chronological order (step  
10 405). However, if the answer to the question is "yes" then the saturation level warning is issued at step 407 to alert the operator to the imminent saturation of the memory storage capacity. If the device is not disconnected or the stored data is not transferred to the control terminal at this stage, then further data items are collected at step 408 and stored in the usual chronological order.  
15 After the collection of each further data item at step 408, a question is asked as to whether saturation capacity of the memory has been reached (step 409). If the answer to this question is "no" then the process returns to step 408 to collect a further data item until the answer to the question in step 409 is "yes". If the saturation level is reached and the question at step 409 is "yes", then a further  
20 warning is issued at step 410 and the collection of further data is blocked as indicated at step 411. The blocking of further data collection at step 411 prevents further transactions occurring in the cash register until the memory of the data storage unit is cleared by transferring the data to the control terminal or the data storage unit is replaced by a second data storage unit having a spare  
25 memory capacity to receive and store further data.

The process by which data is transferred from the portable data storage units of the present invention to the control terminal is detailed in flow charts shown in Figure 5. At any selected time in the data collection process the

portable data storage unit can be dismounted from the cash register as indicated at step 501 of Figure 5 and transported to a control terminal where the portable data storage unit is connected to the control terminal for data transfer, as indicated at step 502 of Figure 5. The data stored in the memory is then

5 transferred chronologically to the control terminal as indicated at step 503, for further processing collation and analysis. On transfer of the data items constituting the data set from the data storage unit to the control terminal as indicated at step 503, the data items are automatically cleared from the memory

10 data storage. A safety check to verify that the data has been successfully transferred and stored on the control terminal prevents data from been cleared when the data transfer has not been successful.



CLAIMS

1. A portable data storage unit adapted to receive and store data generated by a cash register and to transfer said data to a control terminal, said data storage unit comprising:
  - 5 (i) data storage means; and
  - (ii) a data transfer terminal configured to receive data from said cash register for storage in said data storage means and to transfer data stored in said data storage means to said control terminal.
- 10 2. A portable data storage unit according to Claim 1, wherein said data transfer terminal comprises a data input terminal configured to receive data from said cash register and a data output terminal configured to transfer data stored in the data storage means of said unit to the control terminal.
3. A portable data transfer unit according to Claims 1 or 2 wherein data  
15 generated by said cash register is transferred to said unit via a releasable data transfer connection formed between a data output terminal of the cash register and the data transfer terminal of the unit.
4. A portable data storage unit according to any preceding claim, wherein said data transfer unit is configured to be releasably mounted onto, or received  
20 within a cavity or recess of the cash register, such that, when the unit is releasably mounted onto, or received within said cavity or recess of the cash register, the data transfer terminal of the data storage unit is brought into a data transfer engagement with a data output terminal of the cash register.
5. A portable data storage unit as claimed in Claim 1 or according to Claim  
25 1, wherein data generated by the cash register is transferred to the data storage unit via a data transfer cable which connects a data output terminal of the cash register to the data transfer terminal of the data storage unit.

6. A portable data storage unit according to Claims 1 or 2, wherein data is transferred between the cash register and the data storage unit by a means selected from the group consisting of optical fibre data transmission, radio frequency data transmission, infrared data transmission and ultrasound signals.
- 5 7. A portable data storage unit according to any preceding claim wherein data stored in the data storage means of said data storage unit is transferred to the control terminal via a releasable data transfer connection formed between the data transfer terminal of the unit and a data input terminal of the control terminal.
- 10 8. A portable data storage unit according to anyone of Claims 1 to 7, wherein data stored in said data storage means of the unit is transferred to the control terminal by, or via, a data transfer cable which connects the data transfer terminal of the unit to the control terminal.
- 15 9. A portable data storage unit according to anyone of Claims 1 to 7, wherein data stored in the data storage means of the unit is transferred via the data transfer terminal of the unit to the control terminal by a means selected from the group consisting of optical fibre data transmission, radio frequency data transmission, infrared data transmission and ultrasound signals.
- 20 10. A portable data storage unit according to any preceding claim, wherein data received from the cash register is stored in the form of one or more data items, each of said data items corresponding to an individual transaction that has occurred at the cash register.
- 25 11. A portable data storage unit according to any preceding claim, wherein said data storage unit is provided with a display screen which displays the data received from the cash register.
12. A portable data storage unit according to Claim 11, wherein said display screen is an LCD display screen.

13. A portable data storage unit according to any preceding claim, wherein said data storage means is provided with a warning means which functions to alert the operator when the capacity of the data storage means is nearly saturated.
- 5 14. A portable data storage unit according to any preceding claim, wherein said control terminal is a personal computer processor having software and databases operated thereon to process said data received from the data storage unit.
- 10 15. A portable data storage unit according to any preceding claim, wherein data stored in the data storage means of the unit is cleared on transfer to said control terminals.
- 15 16. A portable data storage unit according to Claim 15, wherein said data storage unit is provided with a clear key the operation of which initiates a deletion of data items that have been successfully transferred to the control terminal.
17. A portable data storage unit according to Claims 1 to 16, wherein said data storage unit comprises a battery power supply
18. A method of transferred data from one or more cash registers to a control terminal for collation and analysis, said method comprising the steps of;
- 20 (i) collecting data generated by said one or more cash register and storing said data in one or more portable data storage units as defined in any one of Claims 1 to 16, and
- (ii) transferring said data from said one or more portable data storage units to said control terminal for collation and
- 25 analysis.

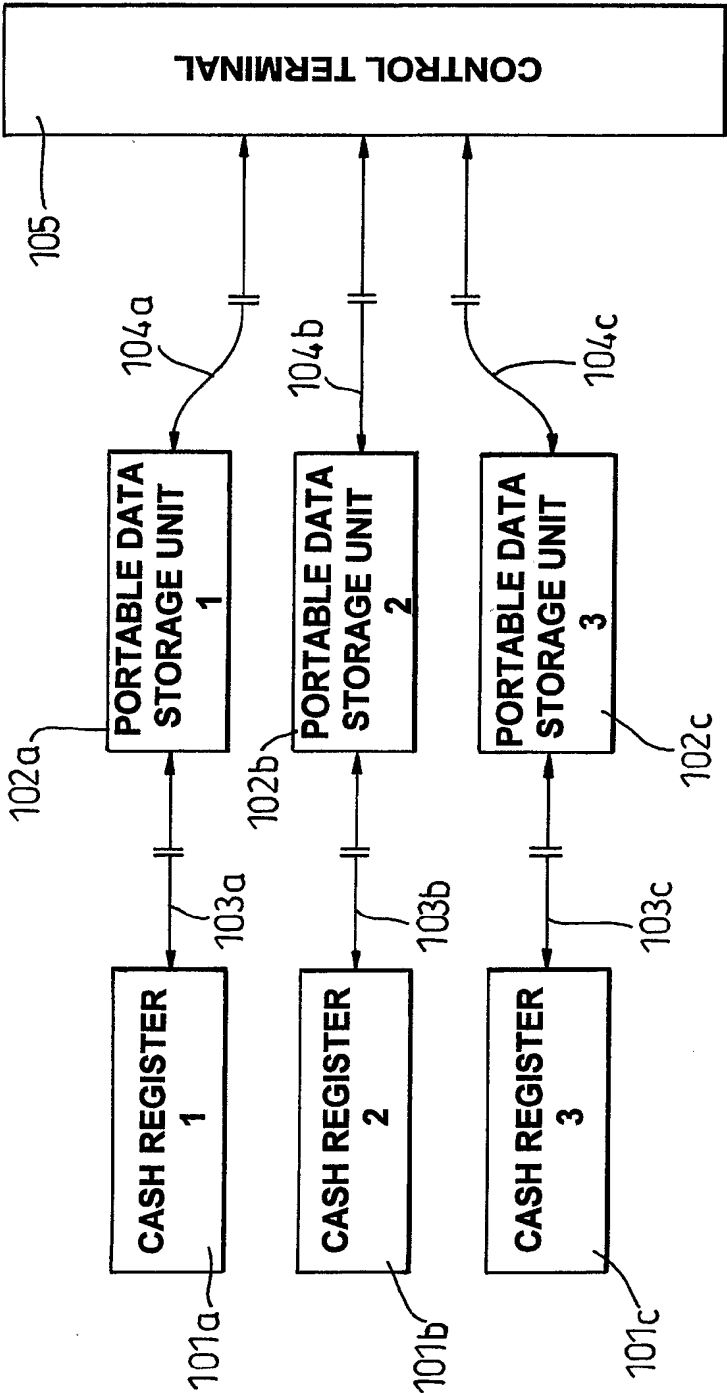


Fig. 1

2/4

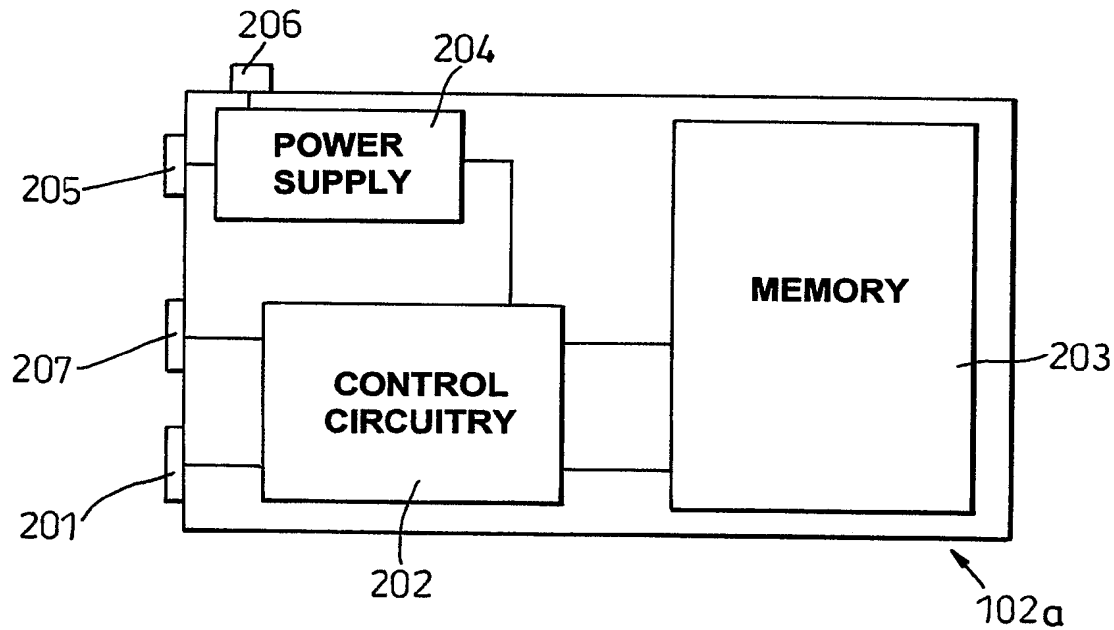


Fig. 2

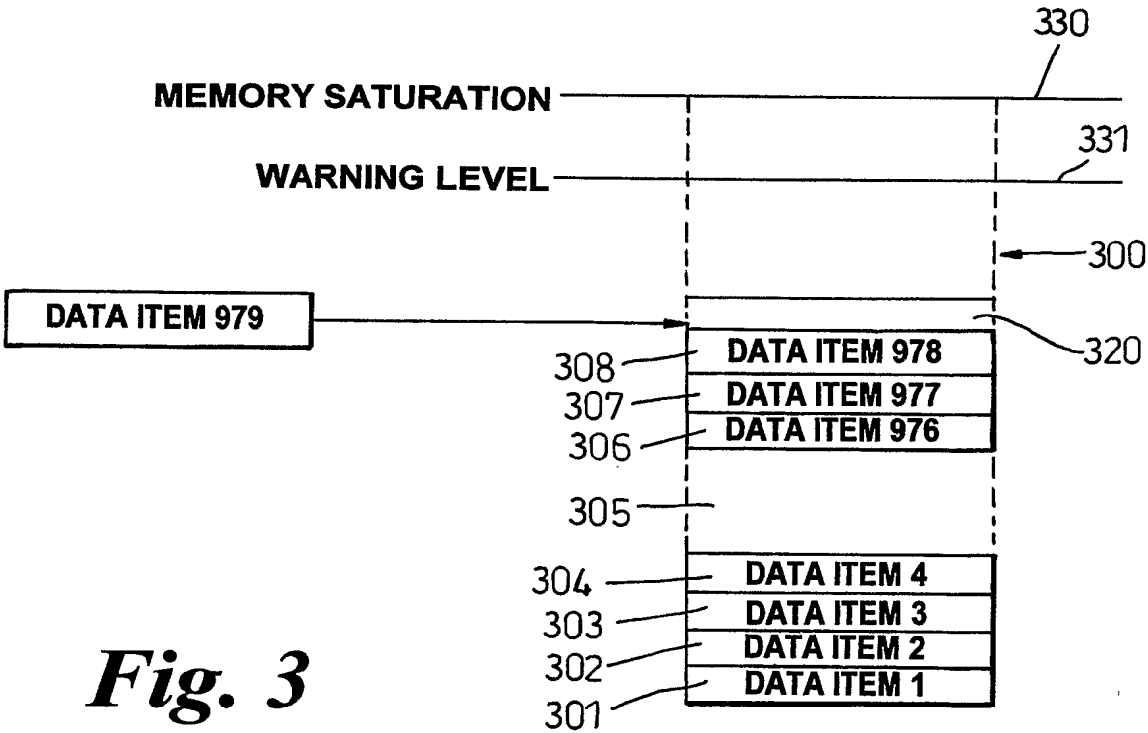
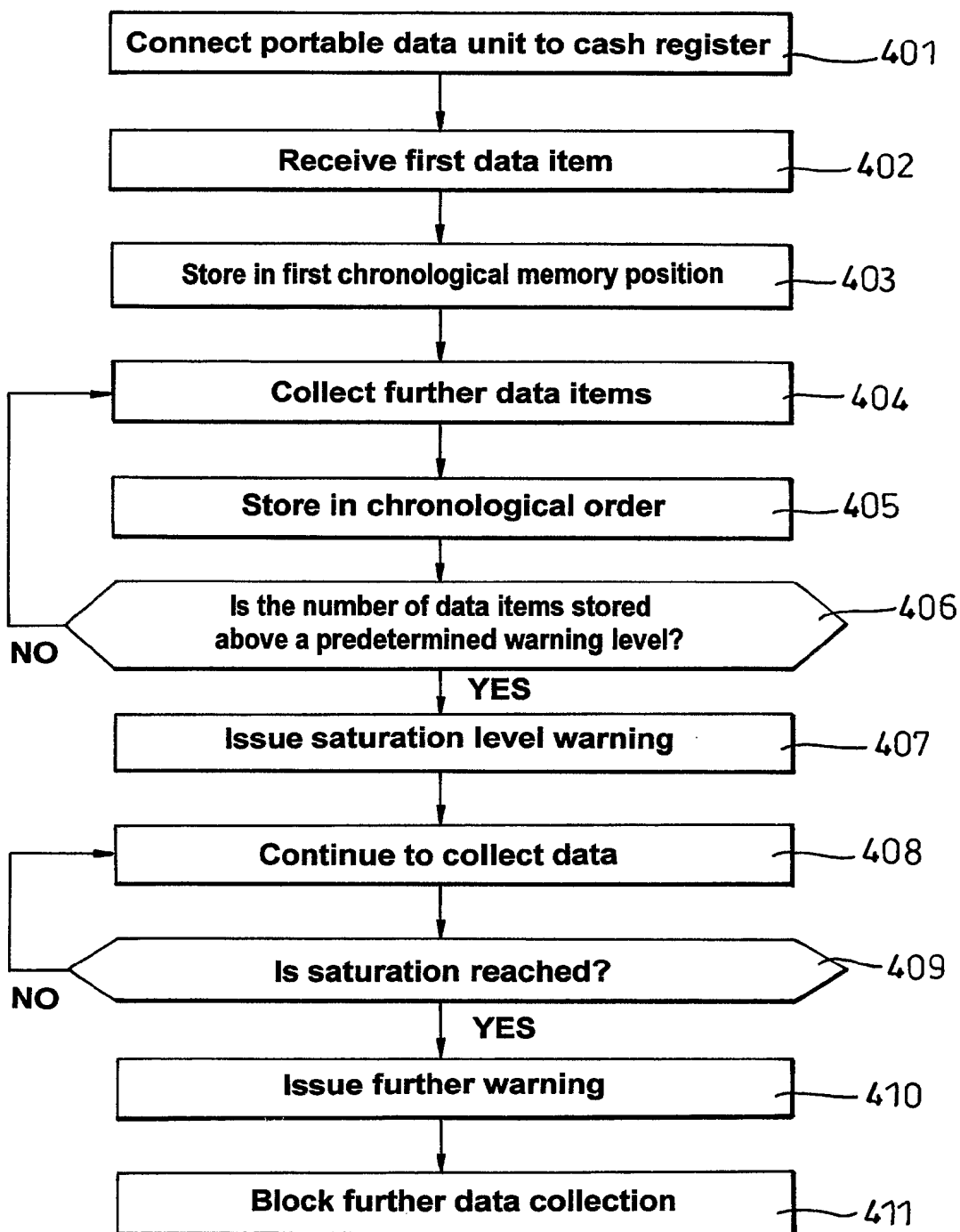
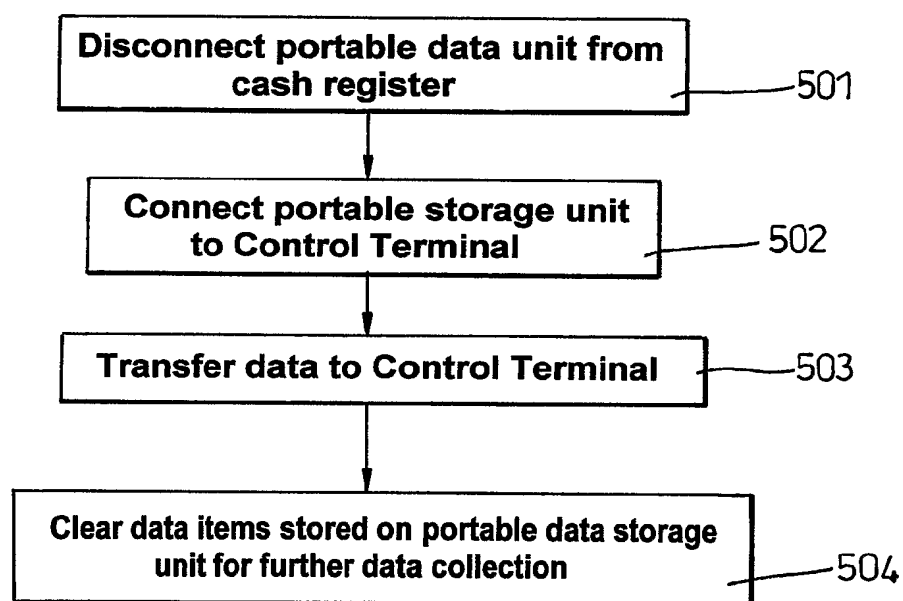


Fig. 3

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*Fig. 4*

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***Fig. 5***